Mississippi Canyon 252 Deepwater Horizon Oil Spill

Natural Resource Damage Assessment Analysis Plan

SEDIMENT TRAP SAMPLE ANALYSIS PLAN

Deepwater Benthic Communities Technical Working Group

November 6, 2014

Approval of this analysis plan is for the purposes of obtaining data for the Natural Resources Damage Assessment. Each Party reserves the right to produce its own independent interpretation and analysis of any data collected pursuant to this plan.

APPROVED:

Robert W. Pirko — 19 MARCH 2015

Department of Commerce Trustee Representative: **Date**

State of Louisiana Representative: **Date**

April 7, 2015

BP Exploration & Production Inc. Representative: **Date**

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BACKGROUND:

Sediment traps were deployed and retrieved to assess potential impacts from the Deepwater Horizon Oil Spill (Oil Spill) as part of the following natural resource damage assessment (NRDA) work plans: the NRDA Tier 1 for Deepwater Communities Plan, the Time Lapse Camera and Sediment Trap Retrieval and Redeployment Plan, and the Deepwater ROV Sampling to Assess Potential Impacts to Hardbottom Coral Communities and Associates from the Deepwater Horizon Oil Spill Plan. These NRDA work plans did not, however, address the analysis of the collected sediment trap samples. In addition, the same sediment traps that were used in those NRDA efforts were deployed prior to the Oil Spill in non- NRDA efforts as part of research funded by the National Science Foundation, the National Oceanic and Atmospheric Administration (NOAA) and the Bureau of Ocean Energy Management. In total, 71 individual sediment trap samples (each representing the less than one millimeter size fraction (i.e., the particulate matter with a particle diameter less than one millimeter) of contents of a sediment sampling cup from a given location, each of which was exposed to falling sediment for the duration of six to 15 days) from six deployments are available for analysis (Table 1). To date, these collected sediment trap samples have been held in archive. In late 2013, five of the 71 samples (samples 15 through 19 in Table 1) were analyzed to determine the efficacy with which hydrocarbons could be detected in these small mass samples. The results of this effort indicated that sufficient and quantifiable masses of extractable hydrocarbons are expected to be recovered from most of the samples.

PURPOSE:

The purpose of this analysis plan is to remove from archive all remaining sediment trap samples and move forward with the extraction of these samples and analysis for hydrocarbons, as detailed below.

Table 1. List of Sediment Trap Samples for Analysis

Sample Number	Sample Affiliation	Area	Lat (N)	Long (W)	Seafloor Depth (m)	Trap Depth (m)	Trap ID	Sample Number in Series	Open (Date)	Closed (Date)	Interval (Days)	Trap area (m^2)	Mass Available for Chemistry (< 1mm) (mg)	POC Content (mg)
1	NRDA	VK	29°09.61'N	88°01.12'W	450	424	RR3	1	16-Mar-11	30-Mar-11	14	0.5	662	50
2	NRDA	VK	29°09.61'N	88°01.12'W	450	424	RR3	2	30-Mar-11	13-Apr-11	14	0.5	3,881	298
3	NRDA	VK	29°09.61'N	88°01.12'W	450	424	RR3	3	13-Apr-11	27-Apr-11	14	0.5	4,569	281
4	NRDA	VK	29°09.61'N	88°01.12'W	450	424	RR3	4	27-Apr-11	11-May-11	14	0.5	2,404	137
5	NRDA	VK	29°09.61'N	88°01.12'W	450	424	RR3	5	11-May-11	25-May-11	14	0.5	2,910	136
6	NRDA	VK	29°09.61'N	88°01.12'W	450	424	RR3	6	25-May-11	8-Jun-11	14	0.5	1,115	98
7	NRDA	VK	29°09.61'N	88°01.12'W	450	424	RR3	7	8-Jun-11	22-Jun-11	14	0.5	343	38
8	NRDA	VK	29°09.61'N	88°01.12'W	450	424	RR3	8	22-Jun-11	6-Jul-11	14	0.5	2,245	209
9	NRDA	VK	29°09.61'N	88°01.12'W	450	424	RR3	9	6-Jul-11	20-Jul-11	14	0.5	1,984	142
10	NRDA	VK	29°09.61'N	88°01.12'W	450	424	RR3	10	20-Jul-11	3-Aug-11	14	0.5	797	78
11	NRDA	VK	29°09.61'N	88°01.12'W	450	424	RR3	11	3-Aug-11	17-Aug-11	14	0.5	733	46
12	NRDA	VK	29°09.61'N	88°01.12'W	450	424	RR3	12	17-Aug-11	31-Aug-11	14	0.5	41	6
13	NRDA	VK	29°09.61'N	88°01.12'W	450	424	RR3	13	31-Aug-11	14-Sep-11	14	0.5	119	11
14	NRDA	VK	29°04.17'N	88°22.64'W	427	401	RR2 M1	1	29-Jul-10	4-Aug-10	6	0.5	1,270	114
15*	NRDA	VK	29°04.17'N	88°22.64'W	427	401	RR2 M1	11	27-Sep-10	3-Oct-10	6	0.5	1,202	57
16*	NRDA	VK	29°04.17'N	88°22.64'W	427	401	RR2 M1	12	3-Oct-10	9-Oct-10	6	0.5	1,681	68
17*	NRDA	VK	29°04.17'N	88°22.64'W	427	401	RR2 M1	13	9-Oct-10	15-Oct-10	6	0.5	2,475	99
18*	NRDA	VK	29°04.17'N	88°22.64'W	427	401	RR2 M1	14	15-Oct-10	21-Oct-10	6	0.5	4,690	176
19*	NRDA	VK	29°04.17'N	88°22.64'W	427	401	RR2 M1	15	21-Oct-10	27-Oct-10	6	0.5	8,847	326
20	NRDA	VK	29°06.44'N	88°23.09'W	332	306	RR2 M2	1	29-Jul-10	4-Aug-10	6	0.5	1,365	120
21	NRDA	VK	29°06.44'N	88°23.09'W	332	306	RR2 M2	2	4-Aug-10	10-Aug-10	6	0.5	4,722	264
22	NRDA	VK	29°06.44'N	88°23.09'W	332	306	RR2 M2	3	10-Aug-10	16-Aug-10	6	0.5	950	49
23	NRDA	VK	29°06.44'N	88°23.09'W	332	306	RR2 M2	4	16-Aug-10	22-Aug-10	6	0.5	1,055	66
24	NRDA	VK	29°06.44'N	88°23.09'W	332	306	RR2 M2	5	22-Aug-10	28-Aug-10	6	0.5	3,813	209

25	NRDA	VK	29°06.44'N	88°23.09'W	332	306	RR2 M2	6	28-Aug-10	3-Sep-10	6	0.5	7,526	327
26	NRDA	VK	29°06.44'N	88°23.09'W	332	306	RR2 M2	7	3-Sep-10	9-Sep-10	6	0.5	3,290	144
27	NRDA	VK	29°06.44'N	88°23.09'W	332	306	RR2 M2	8	9-Sep-10	15-Sep-10	6	0.5	1,535	64
28	NRDA	VK	29°06.44'N	88°23.09'W	332	306	RR2 M2	9	15-Sep-10	21-Sep-10	6	0.5	818	39
29	NRDA	VK	29°06.44'N	88°23.09'W	332	306	RR2 M2	10	21-Sep-10	27-Sep-10	6	0.5	4,255	183
30	NRDA	VK	29°06.44'N	88°23.09'W	332	306	RR2 M2	11	27-Sep-10	3-Oct-10	6	0.5	1,050	41
31	NRDA	VK	29°06.44'N	88°23.09'W	332	306	RR2 M2	12	3-Oct-10	9-Oct-10	6	0.5	900	42
32	NRDA	VK	29°06.44'N	88°23.09'W	332	306	RR2 M2	13	9-Oct-10	15-Oct-10	6	0.5	571	50
33	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	1	11-Sep-09	25-Sep-09	14	0.5	911	35
34	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	2	25-Sep-09	9-Oct-09	14	0.5	2,053	91
35	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	3	9-Oct-09	23-Oct-09	14	0.5	1,761	80
36	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	4	23-Oct-09	6-Nov-09	14	0.5	3,310	146
37	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	5	6-Nov-09	20-Nov-09	14	0.5	1,294	50
38	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	6	20-Nov-09	4-Dec-09	14	0.5	556	55
39	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	7	4-Dec-09	18-Dec-09	14	0.5	1,595	75
40	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	8	18-Dec-09	1-Jan-10	14	0.5	8,142	249
41	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	9	1-Jan-10	15-Jan-10	14	0.5	5,934	249
42	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	10	15-Jan-10	29-Jan-10	14	0.5	4,090	171
43	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	11	29-Jan-10	12-Feb-10	14	0.5	655	40
44	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	12	12-Feb-10	26-Feb-10	14	0.5	1,196	54
45	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	13	26-Feb-10	12-Mar-10	14	0.5	1,862	5
46	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	14	12-Mar-10	26-Mar-10	14	0.5	922	53
47	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	15	26-Mar-10	9-Apr-10	14	0.5	686	58
48	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	16	9-Apr-10	23-Apr-10	14	0.5	271	38
49	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	17	23-Apr-10	7-May-10	14	0.5	315	54
50	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	18	7-May-10	21-May-10	14	0.5	846	82

51	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	19	21-May-10	4-Jun-10	14	0.5	543	33
52	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	20	4-Jun-10	18-Jun-10	14	0.5	730	49
53	NOAA/BOEM (MMS)	VK	29°09.55'N	88°01.13'W	463	457	GOMEX M2 VK01	21	18-Jun-10	2-Jul-10	14	0.5	927	81
54	NOAA/BOEM (MMS)	MC	28°11.64'N	89°47.90'W	436	430	GOMEX M1 MC01	1	11-Sep-09	25-Sep-09	14	0.5	1,793	15
55	NOAA/BOEM (MMS)	MC	28°11.64'N	89°47.90'W	436	430	GOMEX M1 MC01	2	25-Sep-09	9-Oct-09	14	0.5	2,907	12
56	NOAA/BOEM (MMS)	MC	28°11.64'N	89°47.90'W	436	430	GOMEX M1 MC01	3	9-Oct-09	23-Oct-09	14	0.5	1,881	16
57	NOAA/BOEM (MMS)	MC	28°11.64'N	89°47.90'W	436	430	GOMEX M1 MC01	4	23-Oct-09	6-Nov-09	14	0.5	243	15
58	NOAA/BOEM (MMS)	MC	28°11.64'N	89°47.90'W	436	430	GOMEX M1 MC01	5	6-Nov-09	20-Nov-09	14	0.5	201	16
59	NSF (RAPID)	VK	29° 09.62'N	88°01.13'W	452	426	RR1 M2 VK02	1	25-Jun-10	10-Jul-10	15	0.5	1,530	188
60	NSF (RAPID)	VK	29° 09.62'N	88°01.13'W	452	426	RR1 M2 VK02	2	10-Jul-10	25-Jul-10	15	0.5	3,245	317
61	NSF (RAPID)	VK	29° 09.62'N	88°01.13'W	452	426	RR1 M2 VK02	3	25-Jul-10	9-Aug-10	15	0.5	43	5
62	NSF (RAPID)	VK	29° 09.62'N	88°01.13'W	452	426	RR1 M2 VK02	4	9-Aug-10	24-Aug-10	15	0.5	796	34
63	NSF (RAPID)	VK	29° 09.62'N	88°01.13'W	452	426	RR1 M2 VK02	5	24-Aug-10	8-Sep-10	15	0.5	1,910	170
64	NSF (RAPID)	VK	29° 09.62'N	88°01.13'W	452	426	RR1 M2 VK02	6	8-Sep-10	23-Sep-10	15	0.5	424	33
65	NSF (RAPID)	VK	29° 09.62'N	88°01.13'W	452	426	RR1 M2 VK02	7	23-Sep-10	8-Oct-10	15	0.5	802	55
66	NSF (RAPID)	VK	29° 09.62'N	88°01.13'W	452	426	RR1 M2 VK02	8	8-Oct-10	23-Oct-10	15	0.5	2,585	132
67	NSF (RAPID)	VK	29° 09.62'N	88°01.13'W	452	426	RR1 M2 VK02	9	23-Oct-10	7-Nov-10	15	0.5	529	41
68	NSF (RAPID)	VK	29° 09.62'N	88°01.13'W	452	426	RR1 M2 VK02	10	7-Nov-10	22-Nov-10	15	0.5	342	30
69	NSF (RAPID)	VK	29° 09.62'N	88°01.13'W	452	426	RR1 M2 VK02	11	22-Nov-10	7-Dec-10	15	0.5	1,018	51
70	NSF (RAPID)	VK	29° 09.62'N	88°01.13'W	452	426	RR1 M2 VK02	12	7-Dec-10	22-Dec-10	15	0.5	591	59
71	NSF (RAPID)	VK	29° 09.62'N	88°01.13'W	452	426	RR1 M2 VK02	13	22-Dec-10	7-Jan-11	15	0.5	2,579	100

Notes: * = Already analyzed, VK = Viosca Knoll, MC = Mississippi Canyon

METHODS:

All samples will be analyzed at Alpha Analytical Laboratories, and will be analyzed for hydrocarbons using approved NRDA Analytical Quality Assurance Plan (AQAP) chemistry analysis and laboratory methods. The following measurements will be included: total petroleum hydrocarbons (TPH); PAHs including individual parent and alkyl homologues; saturated hydrocarbons including alkanes and isoprenoids; and petroleum biomarkers. Analyses will follow methods provided in the NOAA MC 252 Analytical Quality Assurance Plan.

All materials associated with the collection or analysis of samples under these protocols or pursuant to any approved work plan, including any remains of samples and including remains of extracts created during or remaining after analytical testing, must be preserved and disposed of in accordance with the preservation and disposal requirements set forth in Pretrial Orders ("PTOs") # 1, # 30, #35, # 37, #39 and #43 and any other applicable Court Orders governing tangible items that are or may be issued in MDL No. 2179 IN RE: Oil Spill by the Oil Rig "DEEPWATER HORIZON" (E.D. LA 2010). Destructive analytical testing of oil, dispersant or sediment samples may only be conducted in accordance with PTO # 37, paragraph 11, and PTO # 39, paragraph 11. Circumstances and procedures governing preservation and disposal of sample materials by the trustees must be set forth in a written protocol that is approved by the state or federal agency whose employees or contractors are in possession or control of such materials and must comply with the provisions of PTOs # 1, # 30, # 35, 37, #39 and #43.

In the case of this analysis plan, given the small sample masses of these samples (Table 1) it is anticipated that all of the sediment material from each sample will be extracted. Any extracts remaining after analysis will be retained pursuant to the above.

Each laboratory shall simultaneously deliver raw data, including all necessary metadata, generated as part of this work plan as a Laboratory Analytical Data Package (LADP) to the Trustee Data Management Team (DMT), the Louisiana Oil Spill Coordinator's Office (LOSCO) on behalf of the State of Louisiana, and to BP Exploration & Production Inc. (BP). The electronic data deliverable (EDD) spreadsheet with pre-validated analytical results, which is a component of the complete LADP, will also be delivered to the secure FTP drop box maintained by the Trustees' Data Management Team (DMT), and to LOSCO and BP. Any other preliminary data distributed to the DMT shall also be distributed at the same time to LOSCO and to BP.

Thereafter, the DMT will validate and perform quality assurance/quality control (QA/QC) procedures on the LADP consistent with the authorized AQAP, after which time the validated and/or QA/QC'd data shall be made available simultaneously to all trustees and BP. Any questions raised on the validated and/or QA/QC'd results shall be handled per the procedures in the AQAP, and the issue and results shall be distributed to all parties. In the interest of maintaining one consistent data set for use by all parties, only the validated and/or QA/QC'd data set released by the DMT shall be considered the consensus data set.

In order to assure reliability of the consensus data and full review by the parties, no party shall publish consensus data until seven days after such data has been made available to the parties. Also, the LADP shall not be released by the DMT, LOSCO, BP or a BP designated representative prior to validation and/or QA/QC absent a showing of critical operational need. Should any party show a critical operational need for data prior to validation and/or QA/QC, any

released data will be clearly marked "preliminary/unvalidated" and will be made available equally to all trustees and to BP (or a designated BP representative on behalf of BP).

MILESTONES AND DELIVERABLES:

The primary deliverable under this analysis plan is the results dataset. It is anticipated that analysis will be completed within six weeks of signature of this plan.

ESTIMATED BUDGET

The anticipated budget for the analysis of all of the 71 samples is $103,000. The Parties acknowledge that this budget is an estimate, and that actual costs may prove to be higher or lower. BP's commitment to fund the costs of this work includes any additional reasonable costs within the scope of this approved work plan that may arise. The Trustees will make a good faith effort to notify BP in advance of any such increased costs.